

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Amendment of Part 2 of the Commission's Rules	)	ET Docket No. 00-258
to Allocate Spectrum Below 3 GHz for Mobile and)	
Fixed Services to Support the Introduction of New)	
Advanced Wireless Services, including Third)	
Generation Wireless Systems)	
)	
Amendment of Section 2.106 of the Commission's	)	ET Docket No. 95-18
Rules to Allocate Spectrum at 2 GHz for Use)	
By the Mobile-Satellite Service)	
)	
The Establishment of Policies and Service Rules	)	IB Docket No. 99-81
for the Mobile-Satellite Service in the 2 GHz Band)	
)	
Petition for Rule Making of the Wireless	)	RM-9498
Information Networks Forum Concerning the)	
Unlicensed Personal Communications Services)	
)	
Petition for Rule Making of UTStarcomm, Inc.,	)	RM-10024
Concerning the Unlicensed Personal)	
Communications Service)	

COMMENTS OF ARRAYCOMM, INC.

Of Counsel:

Leonard S. Kolsky
1111 19th Street, N.W.
Suite 1200
Washington, D.C. 20036

October 22, 2001

Bradley Holmes
Senior Vice President
Regulatory and Government Affairs

Randall Coleman
Vice President, Regulatory Affairs

888 Sixteenth Street, N.W.
Suite 700
Washington, D.C. 20006

(202) 833-1925

TABLE OF CONTENTS

I.	INTRODUCTION	2
II.	SPECTRUM FOR TDD TECHNOLOGIES MUST BE AVAILABLE ON AN EQUITABLE BASIS	3
III.	REALLOCATION OF THE 1910-1930 MHZ AND 2010-2025 MHZ BANDS IS WARRANTED ON THE BASES OF TECHNOLOGICAL NEUTRALITY AND DIVERSITY AND THE MARKET FAILINGS OF CURRENT INCUMBENTS	4
A.	1910-1930 MHz	5
B.	1990-2025 MHz	7
IV.	CONCLUSION	10

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Amendment of Part 2 of the Commission's Rules	)	ET Docket No. 00-258
to Allocate Spectrum Below 3 GHz for Mobile and)	
Fixed Services to Support the Introduction of New)	
Advanced Wireless Services, including Third)	
Generation Wireless Systems)	
)	
Amendment of Section 2.106 of the Commission's	)	ET Docket No. 95-18
Rules to Allocate Spectrum at 2 GHz for Use)	
By the Mobile-Satellite Service)	
)	
The Establishment of Policies and Service Rules	)	IB Docket No. 99-81
for the Mobile-Satellite Service in the 2 GHz Band)	
)	
Petition for Rule Making of the Wireless	)	RM-9498
Information Networks Forum Concerning the)	
Unlicensed Personal Communications Services)	
)	
Petition for Rule Making of UTStarcomm, Inc.,	)	RM-10024
Concerning the Unlicensed Personal)	
Communications Service)	

COMMENTS OF ARRAYCOMM, INC.

ArrayComm, Inc.¹ (hereinafter ArrayComm) is pleased to submit the following Comments in response to the Commission's Further Notice of Proposed Rulemaking in the above-entitled matter.²

¹ ArrayComm is a small Silicon Valley-based technology house with plans to introduce innovative new technology into the wireless industry, to benefit consumers wishing to gain access to broadband Internet services. In addition to IntelliCell®, a state-of-the-art adaptive ("smart") antenna technology deployed in more than 90,000 base stations in Asia, ArrayComm is developing *i-BURST*™, a wide-area portable broadband Internet solution. *i-BURST*™ combines the spectral efficiency of IntelliCell® technology with an IP-optimized radio interface and a unique IP-centric architecture. *i-BURST*™ enables large-scale, high-speed wireless Internet networks to be deployed and maintained at significantly lower cost than today's cellular data solutions, as well as the 3G solutions expected in the future. *i-BURST*™ has been optimized to operate over one or more, unpaired bands of radio spectrum using Time Division Duplexing (TDD) transmission technology and delivers as much as one megabit per second (1 mbps) of throughput to each end user.

² Further Notice of Proposed Rulemaking, FCC 01-224, released August 20, 2001 (Further Notice).

I. INTRODUCTION

The Notice of Proposed Rulemaking in this matter,³ launched the Commission's exploration into determining suitable spectrum below 3 GHz for new advanced mobile and fixed terrestrial services including third generation (3G) and future generations of wireless systems. ArrayComm filed Comments in that proceeding, praising the Commission for its emphasis on new technology and its commitment to technological neutrality. ArrayComm pointed out that Time Division Duplex (TDD) technologies do not naturally fit into an allocation scheme devoted to paired spectrum. It was and is our contention, however, that the superiority of TDD to transmit high speed portable data communications, with dramatically improved spectrum efficiency⁴, justifies a significant allocation for this technology, or, at the very least, unpaired spectrum which affords an opportunity to utilize TDD technology. We believe that there is a role for both Frequency Division Duplex (FDD) and TDD in future systems. It is up to industry, with the Commission's guidance, to develop technical criteria to achieve effective co-existence of systems operating within these different types of frequency band allocations.

The Further Notice in this proceeding, adds several frequency bands to those that were under consideration. Securing spectrum adequate to meet present and future wireless requirements from only one or two sources is proving, as ArrayComm cautioned in its initial Comments, to be a daunting task. Readily available spectrum in any meaningful quantity simply does not exist. Some existing spectrum allocations will have to be reallocated. This will entail

³ Notice of Proposed Rule Making and Order, 16 FCC Rcd 596 (2001) (3G NPRM)

⁴ For a complete description of the advantages of TDD when combined with smart antennas, see ArrayComm's Comments and Reply Comments in ET Docket No.00-221

relocation of some systems, identification of replacement spectrum, if necessary, and establishment of mechanisms for covering the cost of relocation.⁵

In this proceeding the Commission raises a number of reallocation or rearrangement possibilities and seeks comment on their feasibility and desirability. Inevitably, users of spectrum under consideration in this proceeding will seek to maintain the status quo, regardless of the extent to which they use the spectrum today and the likelihood that they will make effective use of it in accordance with the existing service rules. In our view, the Commission must assess the viability of the existing allocations based on recent experience, today's market realities and the best interests of the public.

II. SPECTRUM FOR TDD TECHNOLOGIES MUST BE AVAILABLE ON AN EQUITABLE BASIS

ArrayComm continues to urge that spectrum be made available for TDD systems. We are aware that when the spectrum under consideration for reallocation is configured on a paired basis, accommodating unpaired systems can present a unique challenge. Thus, while we would point out that TDD can utilize any spectrum at issue in this Docket, we focus on two bands, 1910-1930 MHz and 2010-2025 MHz, which we believe offer excellent opportunities for TDD systems with little or no adverse impact on existing licensees. Designating these bands for reallocation on an unpaired basis that would be more accommodating to TDD, will have the additional virtue of increasing spectrum harmonization with the rest of the world, which will soon be utilizing these bands for advanced wireless services, such as terrestrial 3G. In a later portion of this filing, we will discuss the advantages of these two bands for TDD in some detail.

⁵ CTIA has suggested that auction revenues could be used to help cover the cost of relocating government users. ArrayComm believes that idea should also be considered for relocation of non-government spectrum as well.

III. REALLOCATION OF THE 1910-1930 MHZ AND 2010-2025 MHZ BANDS IS WARRANTED ON THE BASES OF TECHNOLOGICAL NEUTRALITY AND DIVERSITY AND THE MARKET FAILINGS OF CURRENT INCUMBENTS

A major concern of ArrayComm regarding the substance of this Further Notice is that it seems to retreat somewhat from the technological neutrality that was a cornerstone of the 3G NPRM. There is little, if any, mention of this principle save in Paragraph 44 of this Further Notice. There, the Commission states “Some comments filed in response to [the 3G NPRM] maintain that the preferred minimum allocation per operator would provide both paired and unpaired spectrum” and cites the Comments of Siemens Corporation.

In its Comments, Siemens recognizes that paired and unpaired technologies are often complementary. They offer different solutions and opportunities to wireless users and service providers. Thus, in different parts of the world, TDD spectrum has been allocated either on a stand-alone basis or as a complement to FDD spectrum.

Reading this Further Notice as a whole, we are convinced that the Commission has not renounced technological neutrality. However, the task of identifying all the possible allocation permutations is enormous and may have temporarily moved this issue off center-stage.

ArrayComm has reviewed the spectrum under consideration on the assumption that each megahertz will be put to the best possible use, irrespective of what technology is involved. ArrayComm is cognizant of the fact that reallocation of spectrum that is occupied presents problems of relocation and costs associated therewith. There even may be cases in which reallocation can result in complexities that outweigh the advantages. Given that ALL of the bands in this Docket could be used for TDD⁶, ArrayComm has examined each band not only to

⁶ See ArrayComm’s Comments and Reply Comments in Docket No. 99-168, Service Rules for 746-794 MHz Bands, and Revisions to Part 27 of the Commission’s Rules, Jan. 12, 2001. ArrayComm demonstrated that if the rules provided a level playing field for TDD vs. FDD that the 700 MHz band would be well-suited for TDD. That same reasoning is applicable to bands in this proceeding as well.

determine the impact of such use on existing licensees but also the potential such action would have on future generations of advanced wireless services, including 3G. Based on this analysis, we have identified the 1910-1930 MHz and 2010-2025 MHz bands.

The common thread between them is that they do not appear to be “pairable” in-band nor is there another band with which either should be paired. Thus, they avoid the potential complexities mentioned above and the reallocation impact is narrow. Further, although we recognize that disruption is a hardship on those who are adversely affected, there are degrees of disruption. ArrayComm has, as a consequence, selected bands where (a) the existing usage is sparse or even non-existent because market expectations failed to materialize, or where (b) sharply conflicting views nullified different potential uses or where (c) a proposed usage to provide a global service has not gained international approval, nor is it likely to.

A. 1910-1930 MHz

The Commission has asked whether this spectrum would be suitable for unpaired use for advanced wireless services. Currently, this 20 megahertz serves as a “guard band” between the uplink and downlink segments of PCS systems operating in the 1850-1910 MHz band paired with 1930-1990 MHz. The 1910-1930 MHz band has been divided into two 10 MHz segments. The lower ten is available for asynchronous (high-speed data) operations; the upper ten for isochronous (voice) transmissions. Since the entire band is unlicensed and is restricted to low power, PCS systems have found this spectrum to be ideal as a guard band. The downside, however, is that the band overall has been little used and, in fact, has been wholly unused in the 1910-1920 MHz portion.⁷

⁷ This paragraph encapsulates ArrayComm’s view of 1910-1930 MHz. We believe all 20 MHz should be made available for TDD. The case is particularly compelling for 1910-1920 MHz, spectrum that is not utilized today and is utilized for TDD in many parts of the world.

WINForum's response to the total lack of use of the 1910-1920 MHz band is to propose that the asynchronous operations be phased out and that that spectrum be converted to the isochronous format used at 1920-1930 MHz.⁸ This proposal would be more attractive if the use of that band were so popular that a demand for expansion exists. As the Commission's solicitation of alternative uses for this spectrum suggests, however, the case for expansion of spectrum for isochronous operations is a weak one.

WINForum, in essence, acknowledges that expanding the potential of a service that has shown no potential is not apt to have market appeal. Thus, it is proposing technical amendments to Part 15 of the Commission's Rules, including the spectrum etiquette requirements of Section 15.323. These amendments would relax the rules to such a degree that, WINForum hopes, more users will be attracted. At the same time, the new limits would still leave the band within the purview of Part 15 and under the management of UTAM. The composition of UTAM's membership is not a matter of public record, but it is generally accepted that it includes operators and manufacturers who are influential in the operation, design and supply of PCS systems. It seems highly unlikely (a) that grant of its petition will result in a robust use of the 1910-1930 MHz band, nor (b) that WINForum will look favorably on a system approach such as *i-BURST* that would require PCS systems to upgrade their OOB requirements.

In ArrayComm's opinion, the key question is the ability of TDD or some other technology to utilize this spectrum on a meaningful level, while at the same time affording necessary protection to adjacent channel systems. The best prospect for achieving that objective is to convert this band, in whole or in part, for licensed use with rules similar to those which govern PCS. If 1910-1920 MHz were to be the subject of reallocation, technical safeguards,

⁸ See Petition for Rulemaking filed by WIN Forum on January 8, 1999.

such as guardband or filters, would probably be needed to protect PCS systems from unwarranted interference, and *vice versa*. ArrayComm would be willing to conduct appropriate tests in cooperation with the Commission and PCS licensees to determine the needed levels of protection. Since the 1910-1930 MHz band is regulated under Part 15, it is doubtful that existing operations would interfere with TDD systems. However, as long as low powered PCS systems in the 1920-1930 MHz band remain in their present form, their usage must be considered. Of course, if the entire 20 megahertz were to be subject to reallocation, a modified, albeit different, testing scenario would be employed.

Pursuant to ITU recommendations, the 1900-1920 MHz band will be made available for 3G services on a near-global basis. The United States has, as a general rule, not made its land mobile allocations on the basis of spectrum harmonization with the rest of the world. Whatever the merits of this policy, it has retarded economies of scale for manufacturers and has limited global user compatibility. Reallocation of 1910-1920 MHz, therefore, not only makes available spectrum that is not being used today, but it would result in an increase in global compatibility as well without doing harm to any of our nation's allocation principles. Extending the reallocation to encompass 1910-1930 MHz would put 20 MHz to far more intense use than now exists. Certainly, it is a win/win opportunity that warrants serious consideration.

B. 1990-2025 MHz

The 35 megahertz of spectrum at 1990-2025 MHz, presently allocated for MSS use along with 2165-2200 MHz, fits the criterion ArrayComm has adopted: it is well-suited not only for Advanced Mobile terrestrial use but specifically for TDD operations; it is currently underutilized and likely to remain so if it is not reallocated.

The case for retention of 1990-2025 MHz/2165-2200 MHz for MSS is weak for a number of reasons. First, the basic premise that satellite systems would be able to render service to sparsely populated and/or remote areas that would not otherwise be served by cellular systems has proven to be erroneous. The 1610-1626.5 MHz/2483.5-2500 MHz MSS service championed almost a decade ago at the Commission, and at ITU by the US Government at the behest of certain US companies must be judged, by any objective standard, to have been a failure. Several factors can be pointed to as causative but the end result is clear: MSS systems could not succeed on an economic basis, even at a time when terrestrial cellular systems were not nearly as ubiquitous as they are today.

There was a host of applicants at 1.6 GHz a decade ago and there are a number of new 2 GHz MSS licensees today. However, in the aftermath of the 1.6 GHz disappointment, the prospects that the 2 GHz licenses will result in viable systems or even the launch of a satellite are far from assured.

Many of the 2 GHz proponents have complained that dividing the available spectrum among the licensed entrants will not provide enough spectrum for any of them to render adequate service. Of course, this ignores more fundamental questions: What service and for whom? It is interesting and significant that one 2 GHz entrant, New ICO, wants to incorporate an ancillary terrestrial component to extend MSS availability to urban areas and for indoor use.⁹ It is not surprising that the basis for New ICO's request is its contention that a satellite-only mobile communications service has, at best, questionable viability. More recently, CTIA submitted a

⁹ See Further Notice at page 11.

petition asking that the 2 GHz spectrum in question be reallocated for other purposes, such as terrestrial wireless services.¹⁰

It may be difficult for some to concede with finality that MSS will not fulfill the role that its supporters envisioned. Given the advances in technology that seem to appear daily, it is not beyond possibility that this service will be salvaged in some form or another. On the other hand, there are other immediate and compelling needs for spectrum. The schedule for the launching of these 2 GHz, satellite systems is 2006, assuming no delays or extensions. Regrettably, that does not mean that there will be customers then, or any time thereafter. ArrayComm does not believe that a 70 MHz allocation for MSS is justified based on its past record, present status and a reasonable assessment of its future.

ArrayComm urges reallocation of at least a portion of the 1990—2025 MHz band to advanced wireless communications, such as terrestrial 3G, to other such systems. As we urged with respect to 1910-1920 MHz above, making spectrum available for purposes that are consistent with other regions of the world is especially beneficial. The 2010—2025 MHz segment of the band fits that criterion: it has been designated as 3G TDD spectrum elsewhere in the world. Given that the incumbent Broadcast Auxiliary Service (BAS) users are already scheduled to vacate this spectrum, the only difference will be the identity of the new occupants.

To make the 15 MHz at 2010-2025 MHz available on an unpaired basis (or specifically for TDD with, perhaps, two 7.5 MHz allocations) could have a positive domino effect. Some of the “companion” spectrum 2185-2200 MHz could then be used to relocate Multimedia Multipoint Distribution Service (MMDS) users. They would move from their spectrum in the 2110-2170 MHz band and that entire block could, in turn, be made available for paired 3G

¹⁰ Petition for Rulemaking of the Cellular Telecommunications and Internet Association (filed May 18, 2001).

services. The recent announcement by the Administration that the present prospects of reallocation of 1755-1850 MHz from the Government to the private sector are very dim seems to furnish additional incentive to making 2110-2170 MHz available as, at least, partial relief.

Finally, it should be noted that our proposal would still leave 40MHz of spectrum for 3G MSS, which seems to be in accord with the Commission's stated desire.

IV. CONCLUSION

In summary, ArrayComm believes that a compelling case has been made for:

(1) Reallocation of 1910-1930 MHz for TDD operations. This band is sparsely used, at most. It does not lend itself to being paired with any other identifiable spectrum. For ArrayComm's *i-BURST* system to utilize any or all of this band, licensed use would need to be established. While a "licensed" service implies more regulation, and thus less freedom than an unlicensed service, the reverse is often the case. When spectrum is available on an unlicensed basis, the environment becomes increasingly complex as more and more users occupy the spectrum. Low power and various etiquette procedures help, but they are not sufficient to satisfy the needs of those who seek a service of commercial quality. Rules that set standards as prerequisites to obtaining a license creates a "guaranteed" opportunity to grow that investors strongly prefer. Also, the fact that part of this band has been broadly made available on a worldwide basis for purposes compatible with TDD and would thus increase global spectrum harmonization, provides yet an additional public interest benefit.

(2) Reallocation of 2010-2025 MHz for TDD operations. This band is currently being vacated by the Broadcast Auxiliary Services. Its present proposed use, along with 1990-2010 MHz (paired with 2165-2200 MHz) for MSS is too speculative at a time when there are

immediate needs for spectrum. It is not clear that other Regions will ever make 2010-2025 MHz available for satellite use. In fact, the trend is to favor that spectrum for terrestrial use.

ArrayComm continues to be optimistic that progress to assure that all the major needs for advanced mobile communications will be met. Because technology will inevitably advance, it is essential that the Commission's allocations be flexible. Preconceptions should yield to an open-minded technology neutral approach. This proceeding offers the Commission a crucial opportunity to allow innovative and diverse approaches to solve the spectrum needs of advanced wireless services. ArrayComm urges the Commission to balance the goal of satisfying the requirements of the providers of traditional technologies and services with the needs of providers of emerging technologies. That balance can be achieved through flexible allocations that make spectrum available on an unpaired basis.

Respectfully Submitted,

ARRAYCOMM, INC.

By:

Bradley Holmes
Senior Vice President
Regulatory and Government Affairs

Of Counsel:

Leonard S. Kolsky
1111 19th Street, N.W.
Suite 1200
Washington, D.C. 20036

Randall Coleman
Vice President, Regulatory Affairs

888 Sixteenth Street, N.W.
Suite 700
Washington, D.C. 20006

October 22, 2001

(202) 833-1925